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# Binge Eating and Weight Control: The Role of Experiential Avoidance

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## Abstract

Two thirds of the adults in the United States are overweight or obese. Binge eating is a barrier to treatment adherence and sustained weight loss, and can be seen as a form of experiential avoidance. The current study analyzed the impact of binge eating on weight reduction in a previously published study of a 1-day acceptance and commitment therapy (ACT) workshop ( $N = 83$ ) and the psychological processes accounting for the binge-eating results. ACT participants reported less binge eating, which in turn significantly mediated changes in weight. Mediation analyses also showed that reductions in binge eating were mediated by changes in experiential avoidance. The study suggests that ACT and its targeted processes of change may be particularly relevant to binge eating, and that targeting bingeing is a possible pathway for improving weight management.

## Keywords

binge eating, experiential avoidance, obesity

Two thirds of the adults in the United States are overweight (body mass index [BMI]  $> 25 \text{ kg/m}^2$ ) or obese (BMI  $> 30 \text{ kg/m}^2$ ; Flegal, Carroll, Odgen, & Cutin, 2010). Overweight and obesity are associated with significantly increased

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health risks, including high blood pressure, high cholesterol, type 2 diabetes, coronary heart disease, congestive heart failure, stroke, and increased mortality as well as direct health care costs (e.g., medication, procedures, and hospitalization; Wadden, Stunkard, & Berkowitz, 2005) and indirect costs incurred through loss of productivity (e.g., disability and absenteeism; Quisenberry, Caan, & Jacobson, 1998; Seidell, 1998).

Comprehensive weight-loss programs that include diet, exercise, and behavioral treatment typically produce weight loss; however, they have high rates of attrition and weight loss is rarely maintained. Typically, half of the weight lost is regained in the first year following treatment, and by 3 to 5 years post-treatment, 80% of patients would have returned to or exceeded their pretreatment weight (Perri, 1998; Wadden, Sternberg, Letizia, Stunkard, & Foster, 1989; Wing, 1998). At long-term follow-up ( $M = 4.3$  years), weight loss is reduced to approximately 2% of initial weight (Perri & Corsica, 2002). Furthermore, attrition averages 30% to 60% (Douketis, Macie, Thabane, & Williamson, 2005), with rates as high as 85% (LeBow, 1989). Innovative treatments for weight management are sorely needed.

One barrier to long-term weight control is binge eating (Elfhag & Rossner, 2005; Kalarchian et al., 2002; Sherwood, Jeffery, & Wing, 1999), perhaps in part because of its association with treatment dropout (De Zwaan, Nutzinger, & Schoenbeck, 1992) and psychological distress (Grissett & Fitzgibbon, 1996; Linde et al., 2004; Mussell, Mitchell, De Zwaan, Crosby, & Crow, 1996; Sherwood et al., 1999).

Binge eating can be seen as an extreme form of disinhibited eating, or eating in response to emotional states such as anxiety, depression, or boredom (Allison, Grilo, Masheb, & Stunkard, 2005; De Zwaan et al., 1994; Hsu et al., 2002; Rudman, 1986). Binging may in part serve to reduce these negative thoughts or feelings in the short term (e.g., Barnes & Tantleff-Dunn, 2010; Ghaderi, 2003). A recent study (Kingston, Clarke, & Remington, 2010) found that experiential avoidance mediated the relationship between negative affect and binge eating. Binge eating can thus be seen as a form of experiential avoidance, which is the tendency to try and change or avoid unwanted negative thoughts, emotions, or bodily sensations, even when doing so produces harm (Hayes et al., 2004). Experiential avoidance is a robust predictor of a variety of negative health and psychological problems, including stress, smoking, anxiety, depression, substance abuse, and body mass (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Unfortunately, binge eating often results in more negative thoughts and feelings later; thus, binging feeds a cycle of poor health behaviors (Hilbert & Tuschen-Caffier, 2007; Stein et al., 2007; Wegner et al., 2002), which would be self-amplifying when it is

used for experiential avoidance purposes. As of yet, however, no experimental evidence shows that targeting experiential avoidance can reduce binge eating and do so because that process is impacted.

Acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999) is a modern cognitive behavior therapy developed to target experiential avoidance through a combination of mindfulness, acceptance, values, and traditional behavior change processes. Randomized trials have consistently demonstrated that ACT can treat a variety of psychiatric and health problems by targeting experiential avoidance (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). A growing body of literature indicates that these methods can be helpful in the area of weight control (Forman, Butryn, Hoffman, & Herbert, 2009; Forman et al., 2007; Lillis, Hayes, Bunting, & Masuda, 2009; Tapper et al., 2009).

A recent study compared a 1-day ACT workshop to a wait-list control with 83 participants who already received a weight loss intervention (Lillis et al., 2009). Results showed significantly reduced weight self-stigma and improved weight loss, maintenance, and quality of life at 3-month follow-up among participants who received the workshop. Reductions in general and weight-specific experiential avoidance mediated changes in all outcomes, but there was neither an examination of the role of binge eating in the results seen nor any examination of the relation of experiential avoidance to bingeing. Given recent developments in the science, an examination of these issues with the existing data set seemed warranted to see whether further research is needed. In the current reanalysis of that study, we examined the relationship of binge eating to the weight-reduction results seen with ACT and then examined whether changes in experiential avoidance could have been a pathway to the impact of ACT on binge eating.

## Method

Details about the methods can be found in Lillis et al. (2009). An abbreviated description will be provided here except for the new material not previously reported.

### *Participants*

Participants who had completed at least 6 months of any structured weight-loss program in the past 2 years were recruited from a local weight-loss clinic and from the community through advertisements ( $N = 83$ ). Participants were randomly assigned, with control participants placed on a waiting list while

the experimental group received a 1-day ACT workshop described below. Assessments were repeated after the workshop and 3 months later. Participants in the wait-list control subsequently completed the 1-day ACT workshop after the follow-up assessment.

### *Intervention*

A workshop version of ACT has been useful in a variety of group settings not conducive to traditional psychotherapy (Hayes et al., 2006). Participants randomly assigned to ACT ( $n = 40$ ) were given a 1-day, 6-hr workshop. The intervention employed techniques from the original ACT book (Hayes et al., 1999), some of which were modified to fit problems associated with weight loss and maintenance. The specific methods used taught acceptance, mindfulness, and defusion skills as applied to thoughts and feelings related to eating, body image, and self-stigma. The workshop also sought to clarify life values, especially those related to health and relationships; identify barriers to their implementation; and foster behavioral commitments related to life values. The intervention included information, experiential exercises, and group processing.

### *Measures*

*Demographic and weight information.* Participants' weight and height were recorded by research personnel using standardized equipment. Participants reported their age, gender, and ethnicity via a self-report questionnaire. For purposes of the parametric analysis, weight was converted to BMI using the following formula:  $BMI = (\text{weight in pounds} / \text{height in inches squared}) \times 703$ .

*Acceptance and Action Questionnaire for Weight (AAQW).* It is a 22-item, Likert-type scale that measures acceptance of weight-related thoughts and feelings and the degree to which they interfere with valued action (e.g., "I try hard to avoid feeling bad about my weight or how I look"; Lillis & Hayes, 2008). The AAQW (Cronbach's  $\alpha = .88$ ) has displayed good preliminary psychometrics and construct validity (Lillis & Hayes, 2008) and has been shown to mediate the effects of an ACT intervention on BMI, weight self-stigma, psychological distress, and health-related quality of life (Lillis et al., 2009).

*Binge eating.* Binge eating was assessed through a single item, self-report question: "On average, how many days per week did you have a binge?" Participants circled a number between 0 and 7 days. A "binge" was defined as an episode of eating where large quantities of food were consumed during a very short period of time accompanied by feeling out of control.

**Table 1.** Means and Standard Deviations

Measure	ACT			Control	
	Time 1	Post	Time 2	Time 1	Time 2
Binges	1.78 (1.4)	—	1.35 (1.5)	1.82 (1.4)	2.18 (1.9)
AAQW	89.65 (20.4)	70.79 (22.4)	64.61 (22.2)	88.22 (19.6)	86.63 (18.9)

Note: ACT = acceptance and commitment therapy; AAQW = Acceptance and Action Questionnaire for Weight; binges = number of self-reported “binges” on average per 7 days.

## Results

### Attrition

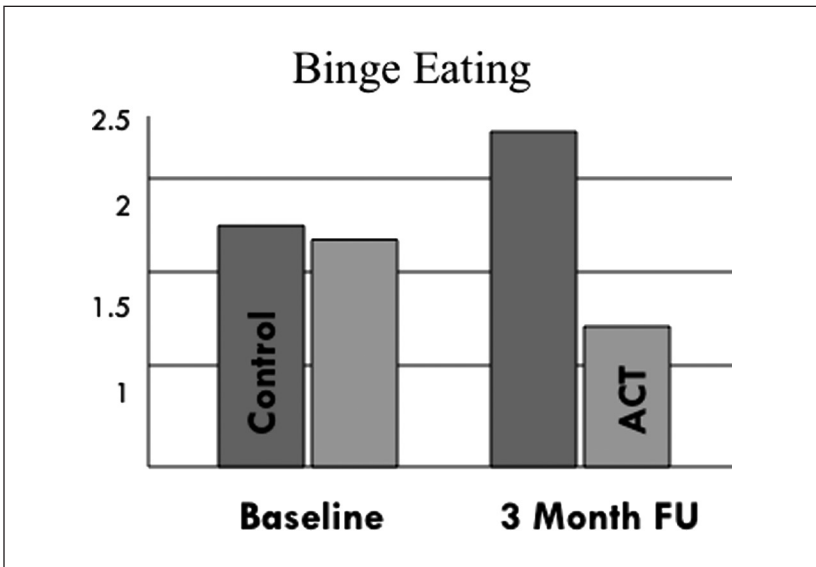
Three participants were assigned to the ACT workshops but neither attended nor provided 3-month follow-up data. All remaining ACT participants ( $n = 40$ ) and all control participants ( $n = 43$ ) completed study procedures and all assessments. Thus, 96% of the designed data were available for analysis.

Means and standard deviations for study measures are shown in Table 1.

### Binge Eating and Weight

In the previous study (Lillis et al., 2009), the workshop was shown to impact weight as measured by changes in BMI. In the present analysis, we first examined whether the workshop impacted binge eating and whether bingeing might in part account for the impact of the workshop on weight. Follow-up scores for binge eating were examined using an ANCOVA with experimental condition as the independent variable and the prescore value as a covariate. The ACT condition showed significant improvements relative to the control condition on binge eating,  $F(1, 83) = 13.83, p < .05$ , partial  $\eta = .06$ . These results are shown in Figure 1.

A mediational analysis was conducted to further test whether changes in binge eating might account in part for the impact of ACT on BMI. A non-parametric multivariate extension of the product-of-coefficients test (Preacher & Hayes, 2008) was used for this analysis, which tests the statistical significance of the cross product of the  $a$  path (treatment-binge eating) and  $b$  path coefficients (binge eating-BMI controlling for treatment). The cross product of the  $a$  and  $b$  path coefficients is equivalent to the difference between the direct and indirect paths, and thus can directly test the statistical significance of the impact of the mediator on the relationship of the treatment condition to changes in binge eating. The best-known cross-products approach is the



**Figure 1.** Average number of reported binges per week  
 Note: ACT = acceptance and commitment therapy; FU = follow-up.

Sobel test, but it requires parametric assumptions that are known to be generally unwarranted given the likelihood of a nonnormal distribution when multiplying coefficients (Preacher & Hayes, 2004, 2008). In the nonparametric approach used in the present study, several thousand bootstrapped samples are taken and the cross-product test is calculated on each. Confidence intervals are then generated for the indirect effect. It is determined to be significant at the determined value (i.e., 95% CI) if zero is not contained inside the confidence intervals. Bias-corrected and accelerated bootstrapping was used with 5,000 samples in this analysis.

Changes in binge eating from baseline to 3-month follow-up were examined as a mediator for changes in BMI from baseline to 3-month follow-up. Results are presented in Table 2. There was a significant indirect effect ( $p < .05$ ) as assessed by the nonparametric cross-product test. This comports with the existing literature as it is well known that bingeing predicts weight gain (e.g., Elfhag & Rossner, 2005), but it adds support to the idea that bingeing may be a key factor in the impact of ACT.

**Table 2.** Mediation of the Impact of Treatment Condition on Changes in BMI Through Changes in Binge Eating

Variable	Point estimate	Product of coefficients		Bootstrapping 95% CI	
		SE	Z	Lower	Upper
Binges	.09	.06	1.42	.01	.25
Normal theory tests for mediation (t and z values)					
Variable	a path X-M	b path M(X)-Y	c path X-Y	c' path X(M)Y	Indirect effect (z score)
Binges	1.74*	2.39**	3.19***	2.77***	1.42

Note: Binges = number of self-reported “binges” on average per 7 days.

\* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ .

### Experiential Avoidance and Binging

Linear regression analysis was performed to examine the relationship between weight-related experiential avoidance, as measured by the AAQW, and binge eating at baseline. Results indicate that the AAQW was significantly related to self-reported binge eating ( $b = 0.36$ ,  $F = 12.5$ ,  $p < .001$ ,  $R^2 = .13$ ).

The impact of the workshop was then examined. ACT participants showed reductions in weight-related experiential avoidance (see Table 1). Follow-up AAQW scores were examined using ANCOVA as above. The ACT condition showed significant improvements relative to the control condition on weight-specific experiential avoidance,  $F(1, 83) = 40.69$ ,  $p < .001$ , partial  $\eta^2 = .33$ .

For the initial mediational analysis, change in AAQW from baseline to 3-month follow-up was entered as the mediator and change in binge eating from baseline to 3-month follow-up was entered as the dependent variable. Analysis 1 of Table 3 shows that the cross-product results for the AAQW with bootstrapped 95% confidence intervals showed that changes in the AAQW mediated binge eating changes.

The primary weakness in this key analysis is that changes in the AAQW and binge eating were assessed at the same time, from baseline to 3-month follow-up, which considerably weakens an ability to claim that the meditation result demonstrates a functionally important pathway in explaining the



**Table 3.** Mediation of the Impact of Treatment Condition on Changes in Binge Eating Through Changes in Weight-Specific Experiential Avoidance

Analysis 1: Pre- to follow-up AAQW and binge eating change scores

Variable	Product of coefficients		Bootstrapping 95% CI		
	Point estimate	SE	Lower	Upper	
AAQW	.78	.28	.27	1.51	
Normal theory tests for mediation (t and z values)					
Variable	a path X-M	b path M(X)-Y	c path X-Y	c' path X(M)Y	Indirect effect (z score)
AAQW	5.97***	3.15***	1.98*	.01	2.82***

Analysis 2: Pre- to follow-up or pre- to postworkshop change scores (see text)

Variable	Product of coefficients		Bootstrapping 95% CI		
	Point estimate	SE	Lower	Upper	
AAQW	.42	.25	.03	1.00	
Normal theory tests for mediation (t and z values)					
Variable	a path X-M	b path M(X)-Y	c path X-Y	c' path X(M)Y	Indirect effect (z score)
AAQW	4.42***	2.15**	1.98*	.87	1.96*

Note: AAQW = Acceptance and Action Questionnaire for Weight.

\* $p < .06$ . \*\* $p < .05$ . \*\*\* $p < .01$ . \*\*\*\* $p < .001$ .

impact of the workshop on binge eating. It could be, for example, that changes in binge eating produced changes in experiential avoidance and not vice versa. Fortunately, AAQW scores were also taken immediately after the 1-day workshop, only for those participants in the workshop condition. As this measure of weight-specific experiential avoidance was before any changes in binge eating could possibly have taken place, a more functional assessment of the putative process could be conducted.

The outcome analysis was first repeated for AAQW scores, using ANCOVA with the prescore as the covariate as before, but replacing follow-up scores with postworkshop scores only for those in the workshop condition. The ACT condition still showed significant improvements relative to the control condition

on weight-specific experiential avoidance,  $F(1, 83) = 21.35, p < .001$ , partial  $\eta^2 = .21$ . Because this analysis is preparatory for a more rigorous meditation analysis, it is important to note that although weight-specific experiential avoidance changed for those in the ACT condition from pre- to postworkshop,  $t(38) = 5.71, p < .001$ , the follow-up weight-specific experiential avoidance scores were unchanged as compared with the prescore for those in the control condition,  $t(38) = 5.71, p < .001$ . Thus, the missing scores at the end of Day 1 for the control participants can be assumed to be unchanged as well.

The modified change score in weight-related experiential avoidance (pre- to postworkshop for the ACT participants; pre- to 3-month follow-up for the control participants) was once again entered into a nonparametric cross products of the coefficients test of mediation relevant to pre- to follow-up changes in binge eating. Results (see Analysis 2, Table 3) were similar to the previous analysis with the nonparametric test showing significant mediation ( $p < .05$ ).

## Discussion

It is well known that binge eating interferes with proper weight control (Elfhag & Rossner, 2005; Kalarchian et al., 2002; Sherwood et al., 1999), as was true in the present study. In accord with the recent evidence that experiential avoidance may be key in bingeing, the current study found that higher levels of experiential avoidance predict self-reported binge eating at baseline, suggesting that binge eating may be in part because of the use of food as part of a toxic emotion-regulation strategy. The primary value of the present study is that it provides the first good experimental evidence that targeting experiential avoidance can reduce bingeing episodes and that this reduction is because of changes in this psychological process. A brief ACT intervention was found to decrease self-reported binge eating at 3-month follow-up. The workshop also decreased weight-specific experiential avoidance, from pre- to postworkshop and from pre- to 3-month follow-up. Treatment effects on binge eating were mediated by reductions in weight-specific experiential avoidance, both at 3 months and immediately after the 1-day workshop. This provides the first good experimental evidence of the functional importance of experiential avoidance for binge eating and does so in a way that avoids confounding process and outcomes changes.

These findings add to a growing literature suggesting that experiential avoidance is relevant to problems of eating and weight. Experiential avoidance has been shown to be relevant to coping with weight-related problems (Lillis & Hayes, 2008) and food cravings (Forman et al., 2007). ACT has

been shown to reduce weight-related self-stigma (Lillis et al., 2009) and to increase exercise (Tapper et al., 2009).

The present study has notable limitations. The sample consisted mostly of White females, which limits the strength and broad applicability of the findings, but perhaps the biggest weakness is that binge eating was assessed with a single-item measure because the study was not planned originally with binge eating in mind. Given the recent developments, however, a reanalysis seemed important. The results support the idea that researchers should develop and test clinical methods for targeting experiential avoidance, which appears to be a common core process for weight-related difficulties, and should be particularly attentive to its possible role in binge eating. Replication with a larger and more diverse sample and a more detailed assessment of binge-eating behavior seems to be the next logical step. The impact of ACT on experiential avoidance appears to be key to its effect on binge eating, and other studies have shown similar impact of this process on weight stigma (e.g., Lillis et al., 2009). Furthermore, research will be needed to assess the breadth of impact of this key psychological process.

### **Declaration of Conflicting Interests**

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

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